UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF TEXAS

Weatherford International, Inc., *et al.*,	§	
	§	
Plaintiffs,	§	
	§	
versus	§	Civil Action H-08-1450
	§	
Peak Completion Technologies, Inc.,	§	
	§	
Defendant.	§	

Claim Construction

1. *Introduction*

Peak Completion Technologies, Inc., and Weatherford International, Inc., both fracture rock strata adjacent to bores of oil and gas wells. Peak says that Weatherford is using a tool that intrudes on its patent monopoly. To determine whether Weatherford's fracturing infringes Peak's patent and whether Peak's patent is valid, the terms of the government's monopoly to Peak must be construed.

2. *Background*

Hydraulic fracturing cracks rock formations using high-pressure fluid. Rock strata are fractured to improve their permeability for the recovery of oil.

Peak's 172 patent describes a system that allows the operator to fracture several areas of the bore. Casing is set into the hole. A layer of cement holds the casing – having been pumped between the casing and the adjacent rock. Along the casing's wall are a series of windows that can be opened to reach the cement. These are called sliding valves. The operator may choose particular valves to open while leaving others shut.

A solvent is pumped into the casing to flow through the open valves and dissolve the cement. Dissolving it exposes the rock of the oil-bearing formation. After it has been dissolved between the casing's open valve and the native rock, the operator injects a fluid through the casing out the open valve and into the adjacent rock. The

pressure of the fluid produces fissures in the rock. These cracks connect the formation's oil-filled voids to the well allowing the oil to be recovered.

3. *Selectively Dissolved, Selectively Fraced.*

Peak's design allows the use of one casing string to complete the well to several oil-bearing rock strata and to produce from them individually, simultaneously, or in combinations all at times of its choosing. That ability to choose valves to open and close is what is meant by the word *selectively*.

Peak and Weatherford disagree whether under the patent dissolving the cement and fracturing the formation must be done in two steps.

Peak says that the patent claims a single action both to dissolve the cement and to fracture the formation; a single burst of fluid eliminates the cement and cracks the formation. To be protected by Peaks patent, Weatherford says that each step must be done separately: first dissolve the cement, then fracture the formation.

The claim describes the actions as occurring distinctly. The valves are opened; and that is followed by dissolving the cement adjacent to them.[1] Doing that opens the well bore to the production zone.[2] Afterwards, the operator fractures[3]. The claim then has the steps in logical order: (a) open the valves, (b) dissolve the cement, (c)fracture the formation.[4] Because the claim twice describes these as distinct steps, they are discrete actions.

Both the specification and prosecution history show dissolving before fracturing. As a matter of physics, the cement must be penetrated before the rock can be cracked, but those two events may be accomplished in one or more acts. The specification repeatedly requires distinct steps: "sliding valves can be opened and the

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[1]U.S. Patent No. 7,267,172 col.10 l.20-22 (filed Sept. 11, 2007).

[2]172 Patent, col.10 ll.23-24.

[3]172 Patent, col.10 ll.25-26.

[4]172 Patent, col.10 ll.29-31.

cement there around dissolved by a suitable acid or other solvent. Once the cement is dissolved, fracing may begin . . . ."[5] and "[t]he operator can ... dissolve the cement [around the valves], and later frac through all or any combination of the sliding valves."[6]

In a clear statement, the prosecution history adopts separate steps: "The present invention does claim and use a 'solvent' to dissolve the cement in the area around the sliding valve *before* fracing."[7] While the patent does, in passing, refer to a separate embodiment of fracturing without first dissolving,[8] it never discloses dissolving while fracturing.

Because the claim, specification, and prosecution history show dissolving before fracturing and show distinct processes, dissolving and fracturing are two separate steps.

4. *Selectively Dissolving.*

Peak says dissolving is not limited to chemical dissolution with acid; it can also be done by mechanical rather than chemical means. To break up, disperse, disintegrate, and destroy are encompassed in *dissolve*, says Peak.

As a result, Peak says, the use of a very high-pressure fluid dissolves the cement when it breaks that barrier between the casing and the rock. This would be, in effect, fracturing the cement and rock in one operation. Peak also says that the patent does not limit the length of time its patent is allowed to dissolve the cement.

When it is used with cement, Weatherford says, dissolving is a chemical reaction where the molecules of the cement separate and become suspended in the fluid; this is roughly parallel to a sugar cube's being sprayed with a stream of water. In this sense, acid is the only known way to shift cement from a solid to a suspension. As a practical matter, dissolution must occur promptly, because no operator can afford to

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[5]172 Patent, col.3 ll.13-15.

[6]172 Patent, col.9 ll.47-49.

[7]Response to March 16, 2007, Office Action, at 10 (emphasis added).

[8]172 Patent, col.6 ll.37-44.

wait for long for the cement and rock to be ready for production. Waiting for the cement to dissolve is costly. While the cement dissolves, the company must pay the fracturing crew, drilling crew, and the hire for the rig. Of course, the postponed production is delayed income with its interest foregone. This practicality is required by patent law through the Constitution's phrase "useful arts;" it is echoed in Peak's phrase "suitable acid" in its patent.

Peak's construction is too broad and shallow. Its first definitional tool is an array of definitions and synonyms from dictionaries. None of them arose in the semi-technical sense that oil-field superintendents and engineers would find useful. The patent's claims, specifications, and prosecution history discuss *dissolving* the cement before fracturing. Nothing in the patent hints at blowing the cement up, ramming it with rods, melting it with lasers, or other merely possible ways to create a hole in the cement. Gun perforating could be designed to pierce the casing, cement, and rock. That is not Peak's invention.

Because the patent intends two actions – dissolving then fracturing – an ordinary artisan, a learned hand, would not think that splintering the cement with fracturing fluid caused the cement to dissolve. Also, the dissolution must occur promptly, because waiting for the cement to dissolve is costly. Because of the delay, a glacial dissolution is not practical – not a useful art. The long-term dissolution Peak offers does not account for the acid's effects on the pipe itself.

"Selectively dissolving said cement" means dissolving the acid-soluble cement adjacent to the open sliding valves with an acid so that the cement and acid promptly form a solution.

3. *Cement.*

Peak says cement means all types of cement – acid-soluble ones and others. Weatherford says cement is limited to acid-soluble cement capable of being promptly dissolved by common acids. At the hearing, laboratory tests were offered to confirm

that not all cements are acid-soluble. Some of them may dissolve in a few minutes, some in several hours, and some hardly at all in a reasonable time.

When the specification discusses the cement around the casing, it is in the context of the cement's being dissolved or with the qualification that the cement is acid soluble. This quotation is illustrative: "[T]he production casing and sliding valves . . . are cemented into place by acid soluble cement . . . . [B]y dissolving the cement adjacent [to the] sliding valve, thereafter, [the] production zone can be fraced and produced through [the] sliding valve."[9]

Because the specification and the claim repeatedly contemplate using acid-soluble cement and because the specification and claim repeatedly teach dissolving the cement, a person of ordinary skill in the art would only understand the cement to be acid-soluble. Cement in patent 172 means acid-soluble cement capable of being promptly dissolved by common acids.

5. *Establish Contact.*

The phrase "establish contact" appears once in the patent. It appears in Claim 1 in the phrase "selectively dissolving . . . cement adjacent to . . . sliding valves to establish contact with . . . at least one production zone."[10]

Peak says "establish contact" means to create any fluid path to the formation. The fluid path may be formed by fracturing fluid, acid, or another solvent. Weatherford says "establish contact" means that the wall of the desired production zone is exposed to the bore only after the cement between the sliding valves and the rock is dissolved by acid.

An oil well must have a path for fluids from the source rock through the cement and casing to the wellhead. The purpose of the entire operation is to establish contact with the oil-bearing formation. This is true of each subsidiary step. Cementing the

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[9] 172 Patent, col.9 ll.33-39.

[10] 172 Patent, col.10 ll.21-23.

casing makes controlled production possible, although it may be cemented well above the zone to be fractured and produced. Fracturing is not always needed; it is a function of the geology rather than an essential step for a well generally.

Because the cement must be acid-soluble and because dissolve means to melt with acid, the formation may only be exposed with the use of acid. "Establish contact" describes the goal of the acid dissolution of the cement. The dissolution by acid of cement between the sliding valve in the casing and the formation opens a path for fracturing fluids and then, in reverse direction, for oil.

7. *With Fracing Material.*

Peak says "with fracing material" means any substance that may be used to fracture a formation. Weatherford says "with fracing material" includes conventional fracturing fluids – nitrogen, slick water – but not explosives or the acid used to dissolve cement. The phrase "fracing material" implies a distinction between it and the dissolving material.

The specification repeatedly shows fracturing as a separate and distinct step from dissolving. An acid-based fracturing material would compress the dissolving and fracturing steps into one action. A mechanical fracturing with explosives eviscerates the requirement that it be dissolved first and dissolved with a "material" described nowhere as the same as the fracturing material.

8. *Flow Rate and/or Fracing Pressures.*

Peak says the phrase "wherein flow rate and/or fracing pressures can be maintained" is the ability to keep those two variables "at desired levels."

Weatherford amends Peak's construction by specifying the nature of a desired level. Weatherford says the phrase means that the volume and pressure of the fluid exceeds the formation hydrostatic pressure and tensile strength; if the opening in the casing and cement is not adequate for these two effects, the operation would fail. Naturally, the valve in the pipe, hole in the cements, and the fissures must be large

enough to permit the outbound flow of oil. Peak says Weatherford's construction places an improper limitation into the claim by requiring a "specific" pressure or flow rate. Weatherford does not identify a specific pressure; rather it describes the principle that the pressure needs to meet to be useful – a principle without particular reference to Peak's device.

Claim 10, where the phrase appears, limits it with the preface that it fit "the method of petroleum production." The specification supports Weatherford's construction because the purpose of the fracturing is the production of oil. To produce oil, the flow rate and fracturing pressure must overcome the pressure of the reservoir to extend fractures into the formation and must leave holes and fissures fit for the production of oil.

9. *Conclusion.*

Weatherford's construction prevails on these terms.

Signed on March 2, 2011, at Houston, Texas.

Lynn N. Hughes
United States District Judge